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# AEROSPACE MATERIAL SPECIFICATION

AMS 5024F
Superseding AMS 5024E

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## STEEL BARS, FORGINGS, AND TUBING, FREE-CUTTING
## 1.5Mn (0.32 - 0.39C) (SAE 1137)

UNS G11370

1. SCOPE:

1.1 Form: This specification covers a free-cutting carbon steel in the form of bars, forgings, mechanical tubing, and forging stock.

1.2 Application: Primarily for parts requiring moderate strength and where free machining qualities are desirable.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2231 - Tolerances, Carbon Steel Bars
MAM 2231 - Tolerances, Metric, Carbon Steel Bars
AMS 2253 - Tolerances, Carbon and Alloy Steel Tubing
MAM 2253 - Tolerances, Metric, Carbon and Alloy Steel Tubing
AMS 2259 - Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2350 - Standards and Test Methods
AMS 2370 - Quality Assurance Sampling of Carbon and Low-Alloy Steels, Wrought Products Except Forgings and Forging Stock
AMS 2372 - Quality Assurance Sampling of Carbon and Low-Alloy Steels, Forgings and Forging Stock
AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys
AMS 2808 - Identification, Forgings

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2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E10 - Brinell Hardness of Metallic Materials
ASTM E350 - Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E350, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

| | min | max |
|---|---|---|
| Carbon (3.1.1) | 0.32 | 0.39 |
| Manganese | 1.35 | 1.65 |
| Phosphorus | -- | 0.040 |
| Sulfur | 0.08 | 0.13 |

3.1.1 When permitted by purchaser, carbon may be 0.37 - 0.44.

3.1.2 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2259.

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Bars and Mechanical Tubing 2.50 In. (62.50 mm) and Under in Nominal OD or Distance Between Parallel Sides: Cold finished, suitable for machining on high speed automatic screw machines.

3.2.2 Bars and Mechanical Tubing Over 2.50 In. (62.5 mm) in Nominal OD or Distance Between Parallel Sides: Hot finished, and normalized or otherwise heat treated to produce best machining qualities.

3.2.3 Forgings: Normalized or otherwise heat treated to produce best machining qualities.

3.2.4 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties: The product shall conform to the following requirements; hardness testing shall be performed in accordance with ASTM E10 on the surface except on rounds, where a flat as necessary for Brinell accuracy may be made:

3.3.1 Hardness: The product shall have hardness as follows or equivalent:

3.3.2 Bars and Mechanical Tubing:

| Nominal OD or Distance Between Parallel Sides | | Hardness |
|---|---|---|
| Inches | Millimetres | HB |
| Up to 0.625, incl | Up to 15.75, incl | 207 - 255 |
| Over 0.625 to 1.000, incl | Over 15.75 to 25.00, incl | 187 - 255 |
| Over 1.000 to 3.000, incl | Over 25.00 to 75.00, incl | 170 - 241 |
| Over 3.000 | Over 75.00 | 149 - 217 |

3.3.3 Forgings: 163 - 229 HB.

3.4 Quality: The product, as received by purchaser, shall be uniform in quality Ø and condition, sound, and, consistent with the type of steel involved, free from foreign materials and from imperfections detrimental to usage of the product.

3.5 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight bars and mechanical tubing will be acceptable in mill lengths of 6 - 20 ft (2 - 6 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.6 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of the following:

3.6.1 Bars: AMS 2231 or MAM 2231.

3.6.2 Mechanical Tubing: AMS 2253 or MAM 2253.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all Ø samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical Ø requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.